ILLINOIS DEPARTMENT OF NATURAL RESOURCES

Illinois State Water Survey

Derek Winstanley, Chief • 2204 Griffith Dr., Champaign, IL 61820 • Tel (217) 333-2210 • Fax (217) 333-6540

ILLINOIS WATER AND CLIMATE SUMMARY
December 2001

December 2001 Overview (Bob Scott)

Temperatures in Illinois during December were much above average—the 14th warmest December since 1895—while precipitation was near average. Soil moisture within the top 40 inches of soil was above the long-term statewide average. Mean streamflows were well above median heights, while shallow groundwater levels were above the long-term average depths.

Temperatures across Illinois (Figure 1) for December were well above average (a +5.4-degree departure). Crop reporting district (CRD) temperatures varied from 4.5 degrees above average (east-southeast and southwest) to 6.4 degrees below average (northwest).

Precipitation (Figure 1) across Illinois was near the average value for the month. The statewide average of 2.67 inches represents a -0.02-inch departure or 99 percent of average. However, district precipitation totals varied considerably from 1.25 inches (northeast) to 5.70 inches (southeast), 54 to 158 percent of average, respectively.

Soil moisture at the end of December was above normal across the state. Conditions were near normal in all but the deepest layer where below normal moisture was found in central Illinois, and normal to above normal soil moisture conditions existed elsewhere.

Mean provisional streamflow statewide was well above the median flow, 365 percent of median (Figure 1). Rivers in Illinois recorded mean discharges in the normal to much above normal range this month. Peak stages recorded along the Illinois River did not exceed flood stage. Mississippi River stations along the Illinois border also peaked below flood stage. The Ohio River at Cairo exceeded flood stage on December 20.

Water surface levels at the end of December were below the normal pool at 11 of 38 reporting reservoirs. Water surface levels at Carlyle Lake, Lake Shelbyville, and Rend Lake were well above target levels. **Lake Michigan's** mean level remains below the long-term average.

Statewide, **shallow ground-water levels** were above average levels for December by 1.8 feet. Levels averaged 1.2 feet above the levels of last month and were approximately 1.7 feet above December levels one year ago.

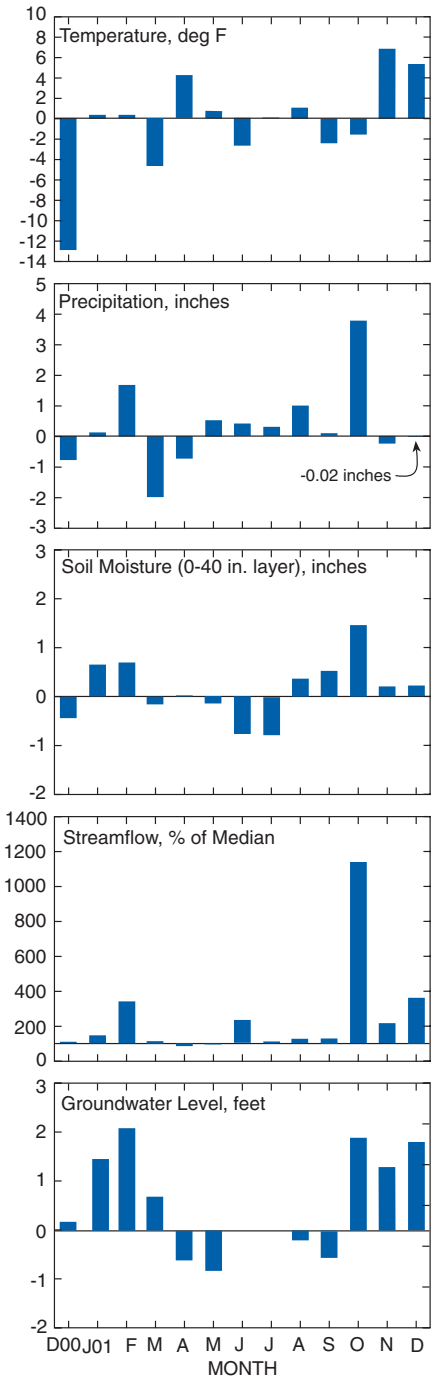

Figure 1.
Statewide departures from normal

Note: *The WARM Network maps and extended network descriptions appear in the January and July issues.*

Contact

Bob Scott: (217) 333-4966, email: r-scott5@uiuc.edu
On the Web at www.sws.uiuc.edu/warm

Weather/Climate Information (Nancy Westcott, Jim Angel, and Bob Scott)

Cook County Precipitation. November precipitation amounts (Figure 2) were generally small. Site values for the month ranged from 2.95 inches of precipitation at site #25 (Chicago Heights) to 1.04 inches at sites #3 (Des Plaines) and #5 (Franklin Park). Precipitation was heaviest in the southeastern corner of the network, and lightest in the northern third of the region. The November 2001 network average of 1.43 inches was about 47 percent of the 12-year (1989–2000) November network average of 3.05 inches.

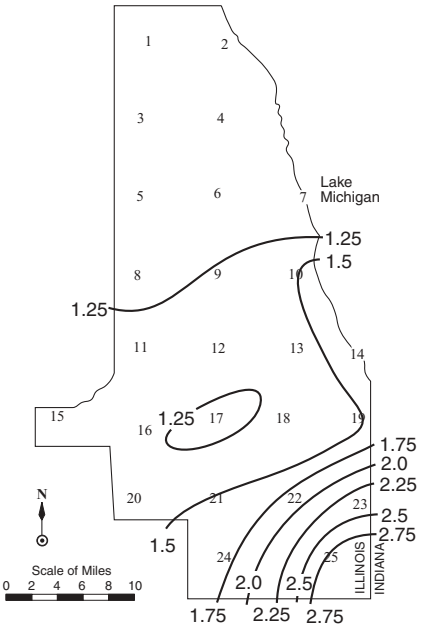

Figure 2.
Cook County precipitation (inches) during November 2001

Temperatures across Illinois for December were much warmer than average (Figure 3 and Table 1). As a result, this was recorded as the 14th warmest December since 1895. Temperatures were 9.7°F above average for the first 23 days of December, followed by 8 days with temperatures 7.1°F below average. Rend Lake reported the warmest reading for the month, 73°F on December 4. The coolest reading was recorded at DeKalb, -2°F on December 30. This was the 2nd warmest November–December (2-month) period, the 3rd warmest October–December (3-month period), the 13th warmest July–December (6-month period), and the 20th warmest January–December (12-month period) since 1895.

Precipitation was near average statewide for December (Figure 3 and Table 1) but varied considerably from north to south. Rainfall amounts ranged from 1 inch in the north to more than 8 inches in the south. Anna reported the highest daily precipitation amount, 3.42 inches on December 17. The highest monthly total was 8.63 inches at Grand Chain Dam, followed closely by 8.25 inches at Dixon Springs. This was the 36th wettest December, the 13th wettest October–December (3-month period), the 17th wettest July–December (6-month period), and the 37th wettest January–December (12-month period) since 1895. Snowfall was below average for December, ranging from no measurable occurrences in southern Illinois to

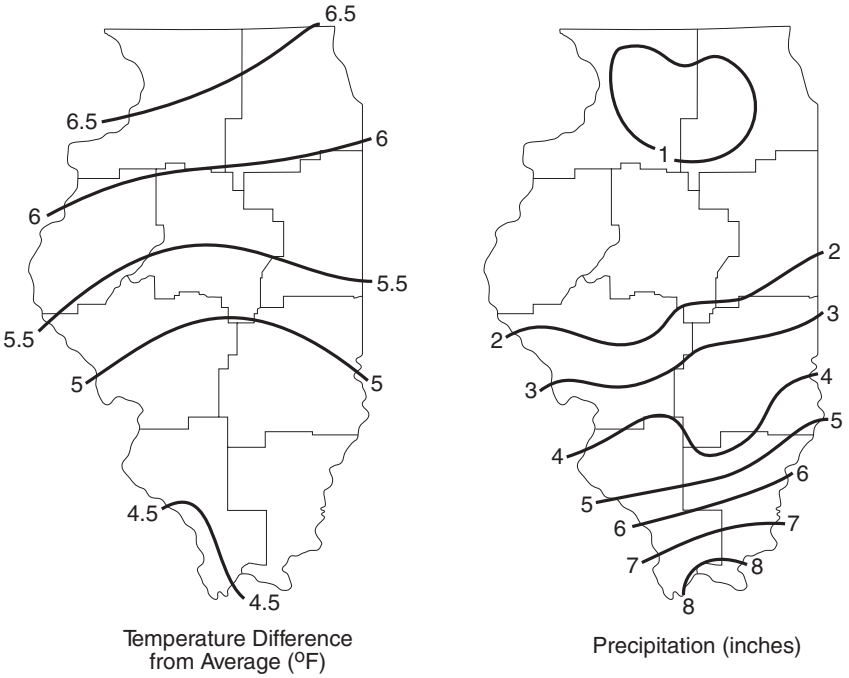

Figure 3. Illinois temperature and precipitation during December 2001

Table 1. Illinois Precipitation (inches) and Temperature (°F) by Crop Reporting District

Crop Reporting District	Last Month			Last 3 Months			Last 6 Months			Last 12 months		
	Dec 01 Amount	% Avg	Temp Dev	Oct 01-Dec 01	% Avg	Temp Dev	Jul 01-Dec 01	% Avg	Temp Dev	Jan 01-Dec 01	% Avg	Temp Dev
Northwest	1.43	70	6.4	7.87	106	5.2	19.80	105	2.7	38.86	107	1.5
Northeast	1.25	54	6.2	9.68	121	4.9	22.85	119	2.5	38.76	106	1.5
West	1.56	69	5.7	8.29	102	4.4	18.50	96	2.1	40.84	109	1.0
Central	1.73	69	5.6	9.56	115	4.4	19.32	102	2.1	38.71	104	1.2
East	2.10	81	5.8	11.72	138	4.3	23.81	123	1.8	39.81	106	1.1
West-southwest	2.74	101	4.8	10.91	122	3.5	21.78	116	1.7	40.68	108	0.9
East-southeast	3.74	122	4.5	14.41	145	3.3	25.01	122	1.6	40.28	98	1.0
Southwest	4.67	137	4.5	14.01	130	3.0	25.61	122	1.4	41.24	96	0.9
Southeast	5.70	158	4.8	17.80	163	3.2	28.84	138	1.6	45.14	102	1.1
State Average	**2.67**	**99**	**5.4**	**11.39**	**128**	**4.0**	**22.65**	**116**	**2.0**	**40.30**	**104**	**1.1**

Note: Data are provisional. Complete, quality controlled data are available about six months after a given month.

1- to 4-inch totals across central and northern Illinois. Average December snowfall ranges from 2 inches (south) to 4 to 5 inches (central) to 8 inches (north). Chatworth reported the most snow for the month, 5.0 inches.

There were no reports of **severe weather** in December.

Illinois Climate Network (ICN) Data. Average daily wind speeds across Illinois for December (Figure 4) ranged from 4.4 mph at Dixon Springs to 11.4 mph at Stelle and Monmouth. The highest wind gust for the month occurred at Carbondale, 48 mph on December 5. The monthly prevailing wind direction was from the west-southwest. Hours during the month with wind speeds in excess of 8 mph ranged from 110 hours at Dixon Springs and Rend Lake to 562 hours at Monmouth. (December has 744 hours.)

Average air temperatures across the state ranged from 30°F at DeKalb to the low 40s in far southern Illinois. Solar radiation neared its yearly minimum, ranging from 181 Mega-Joules per meter squared (MJ/m^2) at Freeport and DeKalb to 234 MJ/m^2 at Belleville. Potential evapotranspiration also approached an annual low, varying from 0.9 inches over northern Illinois to 1.4 inches at Dixon Springs and Belleville. Soil temperatures at the 4-inch level ranged from 38°F at Freeport to 48°F at Dixon Springs. Temperatures at the 8-inch level ranged from the lower 40s in northwestern Illinois to the upper 40s in southeastern Illinois.

Extended climate outlooks issued by the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Climate Prediction Center for January and for January through March call for equal chances of above, below, and normal temperatures and precipitation over all of Illinois.

Soil Moisture Information (Bob Scott)

Precipitation totals in December were generally below average across northern Illinois and above average in southern Illinois. Combined with rainfall amounts during prior months, near average soil moisture conditions were found within the top three soil layers. Soil moisture conditions in the 0- to 6-, 6- to 20-, and 20- to 40-inch layers at the end of the month ranged from 80 to 125 percent of normal across the state (Figure 5). Data for the 40- to 72-inch layer showed a more complex pattern with values that ranged from nearly 60 percent of normal moisture at Bondville to more than 150 percent of normal at Champaign and in southeastern Illinois. Opposing values in this layer for December (and in prior months) between Bondville and Champaign resulted from an excess of precipitation at Champaign of more than 9 inches beginning last June. Overall, soil moisture in Illinois at the end of December was slightly above normal (Figure 1).

Compared to one month ago, soil moisture in the 0- to 6-inch layer increased at three sites in south-central Illinois and decreased at five sites scattered across the state (Table 2). The magnitude of changes in both areas ranged from 15 to 20 percent, while elsewhere, changes were small. Changes in the 6- to 20- and 20- to 40-inch layers were small everywhere, except for scattered increases in central Illinois and a rather large increase at Belleville (67 to 40 percent, respectively).

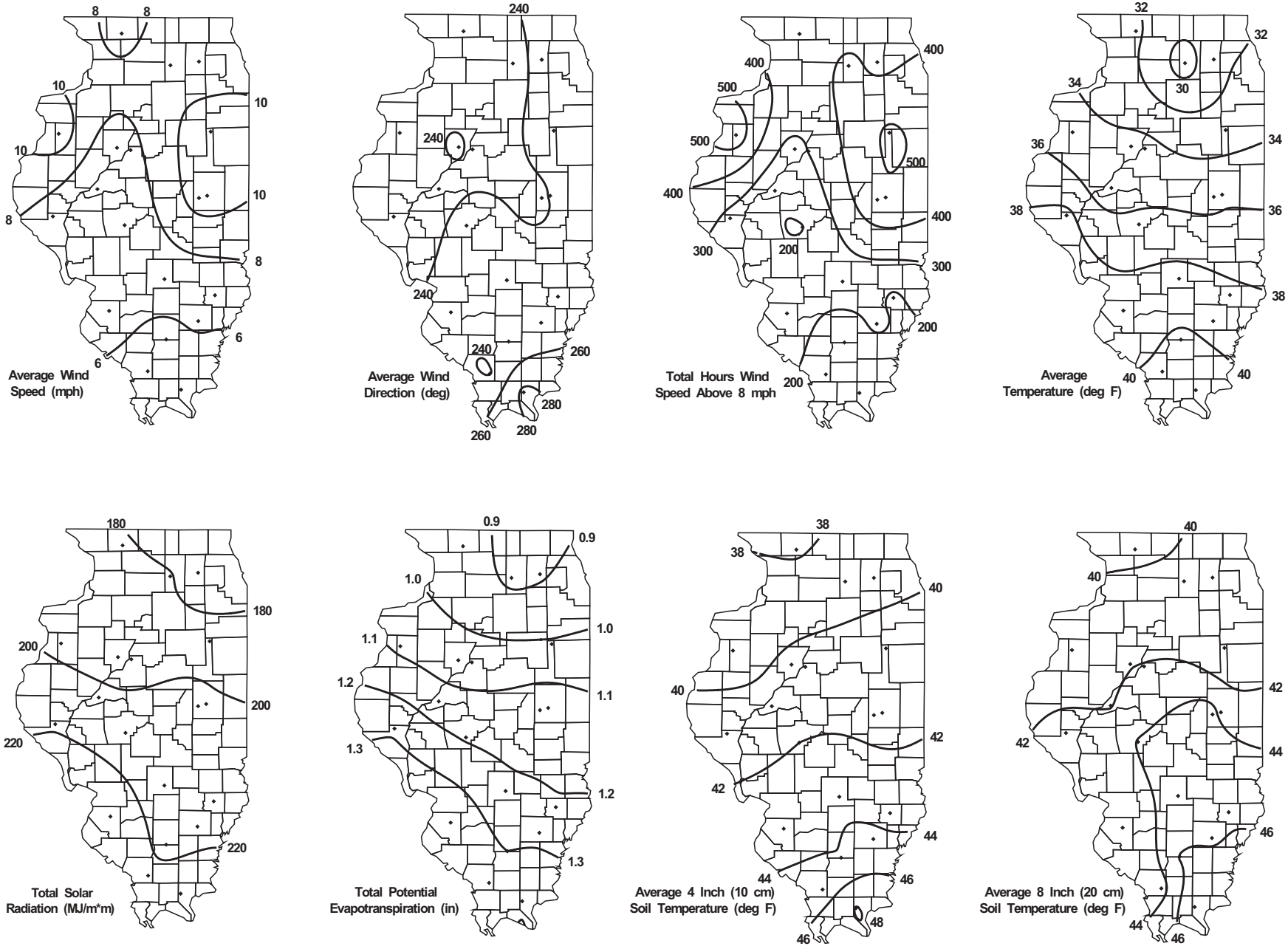

Figure 4. December monthly averages and totals as collected by the Illinois Climate Network

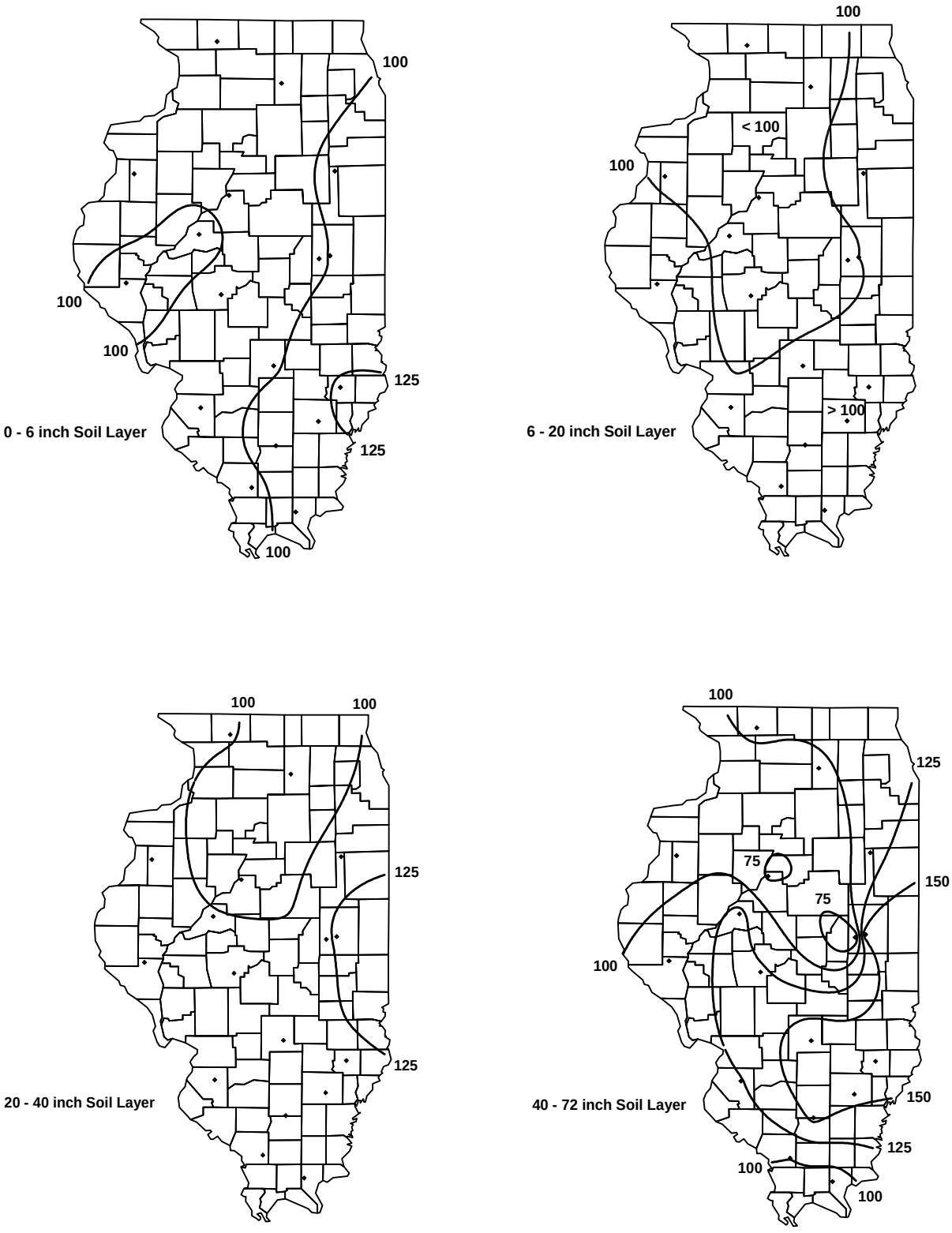

Figure 5. January 1 observed percent-of-normal soil moisture based on 1985-1995 mean

Table 2. Soil Moisture in Various Layers on January 1, 2002

Location	*Jan 1 0 - 6 (inches)*	*Change from Dec 1 (%)*	*Jan 1 6 - 20 (inches)*	*Change from Dec 1 (%)*	*Jan 1 20 - 40 (inches)*	*Change from Dec 1 (%)*
Freeport (NW)	1.9	-14	4.5	-3	7.0	-1
DeKalb (NE)	2.1	-2	4.8	2	6.9	4
Monmouth (W)	2.0	3	4.7	4	6.5	4
East Peoria (C)	2.1	-7	4.9	-1	7.8	9
Topeka (C)	1.3	4	2.7	0	3.3	-4
Stelle (E)	2.3	-6	5.9	4	7.0	0
Champaign (E)	2.2	0	5.2	5	7.4	7
Bondville (E)	2.0	8	4.8	8	8.0	16
Perry (WSW)	2.3	-1	5.6	1	8.0	2
Springfield (WSW)	2.0	-14	5.0	-1	8.3	6
Brownstown (ESE)	2.3	12	4.8	17	8.4	18
Olney (ESE)	2.7	21	4.8	1	7.2	-0
Belleville (SW)	2.2	12	5.0	67	8.5	40
Carbondale (SW)	2.4	-22	5.4	-2	8.1	0
Ina (SE)	2.6	3	5.4	2	7.7	0
Fairfield (SE)	2.5	-14	5.4	-0	7.5	0
Dixon Springs (SE)	2.5	-14	5.3	-5	8.2	-0

Surface Water Information (Sally McConkey)

River and stream discharge and stage data are obtained from gaging stations operated by the U.S. Geological Survey (USGS) or the U.S. Army Corps of Engineers (USACE). The USGS gaging station network is supported in part by the Illinois Department of Natural Resources Office of Water Resources and Illinois State Water Survey, and USACE. Provisional discharge data are obtained from direct computer access to the USGS.

Table 3 lists selected streamgaging stations located on the Illinois, Mississippi, and Ohio Rivers, flood stage, and the provisional peak stage for the current month. The provisional peak stage is determined from the daily morning reading posted by the National Weather Service and/or USACE. Stations on the Illinois River recorded peak stages below flood stage this month. Mississippi River stations along the Illinois border, from Dubuque to Thebes, recorded peak stages below flood stage. The provisional data show that the Ohio River at Cairo peaked above flood stage on December 20.

Mean provisional flow statewide is above the median this month (365 percent of the median) and above the mean (178 percent of the mean). Most stations in northern Illinois recorded above normal flows. A cluster of stations in west-central Illinois recorded flows in the normal range. Flows were generally above normal in the lower half of Illinois. In southern Illinois, the Skillet Fork at Wayne City and the Cache River at Forman were much above normal.

Water-Supply Lakes and Major Reservoirs. Table 5 lists reservoirs in Illinois and their month-end water surface elevation, normal pool, and other data related to observed variations in water surface elevations. Reservoir levels are obtained from a network of cooperating reservoir operators who are contacted each month by Survey

Table 3. Peak Stages for Major Rivers, December 2001

River	*Station*	*River mile**	*Flood stage (feet)**	*Peak stage (feet)***	*Date*
Illinois					
	Morris	263.1	13	7.1	20
	La Salle	224.7	20	15.0	20
	Peoria	164.6	18	13.0	07
	Havana	119.6	14	11.0	25
	Beardstown	88.6	14	11.1	19
	Hardin	21.5	25	20.8	26
Mississippi					
	Dubuque	579.9	17	10.0	13
	Keokuk	364.2	16	6.0	16
	Quincy	325.0	17	11.9	11
	Grafton	218.0	18	16.1	31
	St. Louis	180.0	30	11.1	18
	Chester	109.9	27	15.5	19
	Thebes	43.7	33	23.3	19
Ohio					
	Cairo	2.0	40	41.5	20

Notes:
*River mile and flood stage from *River Stages in Illinois: Flood and Damage Data*, Illinois Department of Natural Resources, Office of Water Resources, July 1998.
**Peak stage based on daily a.m. readings, not instantaneous peak.

staff for current water levels. Most reservoirs listed in Table 5 serve as public water supplies, with the exceptions noted in the last column.

Compared to levels at the end of November available for 34 reservoirs, the water surface elevation at the end of December had risen at 15 reservoirs and decreased at 14 reservoirs. The reported elevation was the same as last month at 5 reservoirs. For the 38 reservoirs reporting at the end of December, 13 reservoirs had water surface levels above the normal pool (or target operating level), 14 reservoirs were at normal pool, and 11 reservoirs were below normal pool. Three reservoirs listed were between 1 and 3 feet below normal pool; only one reservoir was more than 3 feet below normal pool.

Major Reservoirs. Water levels at Carlyle Lake, Lake Shelbyville, and Rend Lake increased this month. Water surface levels at Carlyle Lake, Lake Shelbyville, and Rend Lake were well above target levels.

Great Lakes. Current month mean and end-of-month values are provisional and are relative to International Great Lakes Datum 1985. The December mean level for Lake Michigan was 577.6 feet, compared to a mean level of 576.8 feet in 2000. The long-term average lake level for December is 578.7 feet, based on 1918–1998 data. Historically, the lowest mean level for Lake Michigan in December occurred in 1964 at 576.2 feet, and the highest level occurred in 1986 at 581.6 feet. The month-end level of Lake Michigan was 577.5 feet.

Table 4. Provisional Mean Flows, December 2001

Station	*Drainage area (sq mi)*	*Years of record*	*2001 mean flow (cfs)*	*Long-term flows* *Mean* (cfs)*	*Median (cfs)*	*Flow condition*	*Percent chance of exceedence*	*Days of data this month*
Rock River at Rockton	6,363	65	5,291	3,262	2,964	above normal	13	31
Rock River near Joslin	9,549	57	6,750	5,007	4,839	above normal	22	31
Pecatonica River at Freeport	1,326	81	992	684	577	above normal	21	30
Green River near Geneseo	1,003	61	483	467	352	normal	42	31
Edwards River near New Boston	445	62	123	178	101	normal	46	31
Kankakee River at Momence	2,294	82	2,922	1,990	1,714	above normal	22	31
Iroquois River near Chebanse	2,091	76	2,655	1,523	946	above normal	20	31
Fox River at Dayton	2,642	80	1,981	1,486	1,236	above normal	21	31
Vermilion River at Pontiac	579	55	461	335	155	above normal	29	26
Spoon River at Seville	1,636	83	390	670	397	normal	51	31
LaMoine River at Ripley	1,293	76	514	497	263	normal	38	27
Bear Creek near Marceline	349	55	90.3	142	36	normal	41	31
Mackinaw River near Congerville	767	51	466	397	171	normal	39	26
Salt Creek near Greenview	1,804	58	907	1,033	533	normal	36	31
Sangamon River at Monticello	550	87	482	343	164	above normal	27	31
So. Fork Sangamon near Rochester	867	50	946	526	116	above normal	21	30
Illinois River at Valley City	26,743	61	20,420	17,860	14,962	normal	32	31
Macoupin Creek near Kane	868	71	1,084	455	123	above normal	18	31
Vermilion River near Danville	1,290	56	1,609	865	468	above normal	25	31
Kaskaskia River at Vandalia	1,940	30	2,311	1,999	1,221	normal	36	31
Shoal Creek near Breese	735	56	1,475	552	168	above normal	12	31
Embarras River at Ste. Marie	1,516	86	3,147	1,242	777	above normal	13	30
Skillet Fork at Wayne City	464	80	1,524	417	240	mcuh above normal	06	31
Little Wabash below Clay City	1,131	85	2,810	1,014	448	above normal	10	31
Big Muddy at Plumfield	794	85	1,850	650	336	above normal	11	31
Cache River at Forman	244	76	1,638	321	188	much above normal	04	31

Notes:

*As reported in U.S. Geological Survey (USGS) Water Resources Data, Illinois, Water Year 1999.

Much below normal flow = 90-100% chance of exceedence.

Below normal flow = 70-90% chance of exceedence.

Normal flow = 30-70% chance of exceedence.

Above normal flow = 10-30% chance of exceedence.

Much above normal flow = 0-10% chance of exceedence.

Table 5. Reservoir Levels in Illinois

For security considerations, statewide tabular reservoir data are not available on the Internet. Specific data requests may be made to Sally McConkey at: sally@sws.uiuc.edu.

Groundwater Information (Ken Hlinka)

Comparison to Average Levels. Shallow groundwater levels in 13 observation wells that are remote from pumping centers were above average levels for December by 1.8 feet and ranged from 0.6 feet below to 5.9 feet above average (Table 6).

Comparison to Previous Month. Shallow groundwater levels in December were above those observed in November. Levels averaged 1.2 feet above those of last month and ranged from 1.1 feet lower to 5.0 feet higher than one month ago.

Comparison to Same Month, Previous Year. Shallow groundwater levels from the network this month were above levels of December 2000. Levels averaged 1.7 feet higher and ranged from 1.5 feet below to 6.5 feet above levels of last year.

Table 6. Month-End Shallow Groundwater Level Data Sites, December 2001

					Deviation from			
Number	*Well name*	*County*	*Well depth (feet)*	*This month's reading (depth to water, feet)*	*15-year avg. level (feet)*	*Period of record avg. (feet)*	*Previous month (feet)*	*Previous year (feet)*
1	Galena	JoDaviess	25.0	21.86	-0.12	-0.19	-0.58	-0.75
2	Mt. Morris	Ogle	55.0	N/A	N/A	N/A	N/A	N/A
3	Crystal Lake	McHenry	18.0	NA	N/A	N/A	N/A	N/A
4	Cambridge	Henry	42.0	9.74	-1.15	-0.63	+0.49	-1.46
5	Fermi Lab	DuPage	15.0	5.30	+1.79	+1.96	+1.41	+2.52
6	Good Hope	McDonough	30.0	N/A	N/A	N/A	N/A	N/A
7	Snicarte	Mason	42.0	37.67	-0.54	-0.62	-0.03	+0.05
8	Coffman	Pike	28.0	9.84	+3.08	+2.68	+0.58	+6.51
9	Greenfield	Greene	20.70	6.68	+6.06	+5.87	+5.00	+4.60
10	Janesville	Cumberland	11.0	4.96	-0.01	+0.10	+0.34	+0.17
11	St. Peter	Fayette	15.0	0.47	+1.51	+1.92	+3.12	+1.09
12	SWS #2	St. Clair	80.0	N/A	N/A	N/A	N/A	N/A
13	Boyleston	Wayne	23.0	1.77	+3.63	+4.01	-0.78	+0.35
14	Sparta	Randolph	27.0	3.62	+4.22	+5.04	+4.24	+3.76
15	SE College	Saline	10.19	2.22	+1.90	+2.24	+0.02	+2.74
16	Dixon Springs	Pope	8.63	1.65	+2.89	+1.27	-1.10	+3.09
17	Bondville	Champaign	21.0	3.87	+0.47	+0.13	+2.51	-0.62
				Averages	+1.82	+1.83	+1.17	+1.70

Note:
N/A= Data not available.

Data sources for information in this publication include the following:

CPC - Climate Predication Center, http://www.cpc.ncep.noaa.gov/products/predictions/
ISWS - Illinois State Water Survey, http://www.sws.uiuc.edu/
MCC - Midwestern Regional Climate Center, http://mcc.sws.uiuc.edu/
NCDC - National Climate Data Center, http://www.ncdc.noaa.gov/
NWS - National Weather Service, http://www.nws.noaa.gov/
USACE - U.S. Army Corp of Engineers, http://water.mvr.usace.army.mil/
USGS - U.S. Geological Survey, http://water.usgs.gov/
WARM - Water and Atmospheric Resources Monitoring Program, http://www.sws.uiuc.edu/warm/